भारतीय मानक
Indian Standard

IS 899 : 2022

टैपिओका सागो (साबूदाना) — विशिष्टि

(दूसरा पुनरीक्षण)

Tapioca Sago (*Saboodana*) — Specification

(Second Revision)

ICS 67.180.20

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August 2022 **Price Group 3**

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Foodgrains, Allied Products and Other Agricultural Produce Sectional Committee had been approved by the Food and Agriculture Division Council.

Sago is a processed food starch marketed in the form of small globules or pearls. In Hindi, it is known as *Saboodana*. The name sago is derived from the original product which used to be manufactured from the starchy stem of the core of the stem of several palms, the principal being the sago palm (*Metroxylon sagu* and *M. rumphii*). Sago is manufactured in India from the starch obtained from the tubers of tapioca (*Manihot utilissima*).

This standard was originally published in 1956 and subsequently revised in 1971 to reduce the limit of moisture content from 12.0 percent to 11.0 percent and to include the requirements of starch, protein, sulphur dioxide and crude fibre.

The current revision has been brought out to align the requirements of tapioca sago with the *Food Safety and Standards* (*Food Products Standards and Food Additives*) *Regulations*, 2011, fix the limits of hydrocyanic acid as per the *Food Safety and Standards* (*Contaminants, toxins and Residues*) *Regulations*, 2011 and introduce grading of the product based on the *Tapioca Sago Grading and Marking Rules*, 2007. Following changes have been incorporated in the current revision:

a) Requirements for different grades of tapioca sago have been introduced, separately; and

b) Limit of hydrocyanic acid has been specified.

In the formulation of this standard, due consideration has been given to the provisions of the *Food Safety and Standards Act*, 2006 and the *Rules* and *Regulations* framed thereunder and the *Legal Metrology* (*Packaged Commodities*) *Rules*, 2011. However, this standard is subject to the restrictions imposed under these, wherever applicable.

The composition of the Committee, responsible for the formulation of this standard is given at Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

TAPIOCA SAGO (SABOODANA) — SPECIFICATION

(Second Revision)

1 SCOPE

This standard prescribes the requirements and the methods of sampling and test for Tapioca Sago (*Saboodana*).

2 REFERENCES

The standards given below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards.

IS No.	*Title*
460 (Part 1) : 2020	Test sieves — Wire cloth test sieves (*fourth revision*)
1070 : 1992	Reagent grade water — Specification (*third revision*)
2491 : 2013	Food hygiene — General principles — Code of practice (*third revision*)
4662 : 1977	Methods for sampling of starches and starch products (*first revision*)
4706	Methods of tests for edible starches and starch products
(Part 1) : 1978	Physical methods (*first revision*)
(Part 2) : 1978	Chemical methods (*first revision*)
14968 : 2015	Textiles — High density polyethylene (HDPE)/polypropylene (PP) woven sacks for packing 50 kg/25 kg sugar — Specification (*first revision*)
15138 : 2010	Textiles — Jute bags for packing 50 kg sugar — Specification (*first revision*)
16208 : 2015	Textiles — High density polyethylene (HDPE)/polypropylene (PP) woven sacks for packaging 10 kg, 15 kg, 20 kg, 25 kg and 30 kg foodgrains — Specification

3 GRADES

The material shall be of the following three grades:

a) Special;
b) Standard; and
c) General.

4 REQUIREMENTS

4.1 Description

Tapioca sago shall be in the form of small, hard, clean, wholesome globules or pearls of uniform colour, shape and size made from the starch obtained from the tuberous roots of manihot plant commonly known as cassava or tapioca (*Manihot esculenta crantz* syn. *Utilissima*). The product shall be pearl white in colour having characteristic taste and flavour. It shall be free from fermented or musty or any other objectionable odours, added sweetening or colouring matters, bleaching, whitening agent or optical whiteners, adulterants, insect infestation, live and dead insects, mould/mites/fungal contamination and larvae.

NOTE — The appearance, taste and odour shall be determined by sensory analysis tests as agreed to between the manufacturer and purchaser. The contamination, infestation and spoilage visible to the eye (corrected, if necessary for abnormal vision) shall be determined with the aid of a suitable magnification (not exceeding 10X).

4.2 The product shall be made from starch obtained from sound tubers of tapioca, free from any fungal or bacterial contamination.

4.3 The product, when examined by the method prescribed in **6** of IS 4706 (Part 1), shall be free from dirt, or other suspended and extraneous matter (any foreign matter in product including filth, sand and soil, glass and rust etc).

4.4 Gelatinization

When cooked and tested by the method prescribed in **8** of IS 4706 (Part 1), the quantity of starch passed into the gruel shall not exceed 30 percent by mass of the matter taken for the test, and the individual globules or pearls shall retain the globular shape.

4.5 The pesticide residues, if any, in the product shall not exceed the limits as prescribed in the *Food Safety and Standards* (*Contaminants, Toxins and Residues*) *Regulations,* 2011.

4.6 The product shall be processed and packed under hygienic conditions (*see* IS 2491).

4.7 In addition to above, the product shall also comply with the requirements given in Table 1.

5 PACKING AND MARKING

5.1 Packing

Unless otherwise agreed to between the purchaser and the vendor, the material shall be packed only in sound, clean and dry containers (bags, pouches, etc) made of jute bags with suitable inner lining of food grade materials (*see* IS 15138) or HDPE/PP woven sacks (*see* IS 14968 and IS 16208). The container shall be free from any insect infestation or fungus contamination and also free from any undesirable or obnoxious smell.

5.2 Marking

5.2.1 The ink used for marking shall be of such quality which may not contaminate the product. Each pack shall be suitably marked as to give the following information:

a) Name and grade of the material;
b) Month and year of manufacture;
c) Name and address of the manufacturer;
d) Batch or code number;
e) Net quantity;
f) Best before……..month…….year; and
g) Any other information required under the *Legal Metrology* (*Packaged Commodities*) *Rules*, 2011 and the *Food Safety and Standards* (*Labelling and Display*) *Regulations*, 2020.

5.2.2 *BIS Certification Marking*

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

6 SAMPLING

Representative samples of the material for ascertaining conformity to the requirements of this standard shall be drawn according to the method given in IS 4662.

7 TESTS

7.1 All the tests shall be carried out as specified in **4.3**, **4.4** and *col* 6 of Table 1.

7.2 Quality of Reagents

Unless specified otherwise, pure chemicals shall be employed in tests and distilled water (*see* IS 1070) shall be used where the use of water as reagent is intended.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the test results.

7.3 Sample for tests

Prepare the sample for the tests prescribed in **4.3** and *col* 6 of Table 1, as given in **7.3.1**.

7.3.1 Take about 100 g of the product and finely powder in a clean pestle and mortar so that whole of it passes through 250 micron IS Sieve [*see* IS 460 (Part 1)]. Place this prepared material in a clean and dry stoppered glass bottle or any other suitable air-tight container.

NOTE — In case 250 micron IS Sieve [conforming to IS 460 (Part 1)] is not available, BS Test Sieve 60, ASTM Sieve 60, or Tyler Sieve 60, which have their apertures within the limits specified for this IS Sieve, may be used.

Table 1 Requirements for Tapioca Sago (*Saboodana*)

(*Clauses* 4.7, 7.1 *and* 7.3)

Sl No.	Characteristic	Requirement			Method of Test, Ref to
		Special Grade	Standard Grade	General Grade	
(1)	(2)	(3)	(4)	(5)	(6)
i)	Moisture, percent by mass, *Max*	11.0	11.0	12.0	**4** of IS 4706 (Part 2)
ii)	Total ash (dry basis), percent by mass, *Max*	0.30	0.40	0.40	**5** of IS 4706 (Part 2)
iii)	Acid insoluble ash (dry basis), percent by mass, *Max*	0.10	0.10	0.10	**8** of IS 4706 (Part 2)
iv)	Starch (dry basis), percent by mass, *Min*	98.0	98.0	96.0	**9** of IS 4706 (Part 2)
v)	Protein (dry basis), percent by mass, *Min*	0.3	0.3	0.3	**10** of IS 4706 (Part 2)
vi)	Sulphur dioxide, ppm, *Max*	100	100	100	**11** of IS 4706 (Part 2)
vii)	Crude fibre (on dry basis), percent by mass, *Max*	0.15	0.20	0.20	**12** of IS 4706 (Part 2)
viii)	*p*H of aqueous extract	4.5 to 7.0	4.5 to 7.0	4.5 to 7.0	**13** of IS 4706 (Part 2)
ix)	Colour of gelatinized alkaline paste in the procelain cuvette on the Lovibond Scale, not deeper than	0.2 R + 1.0 Y	0.3 R + 1.0 Y	0.4 R + 1.5 Y	**9** of IS 4706 (Part 1)
x)	Hydrocyanic acid, mg/kg, *Max*	5	5	10	Annex A

ANNEX A

[*Table* 1, *Sl No*. (x)]

DETERMINATION OF HYDROCYANIC ACID

A-1 PRINCIPLE

The glucosides are hydrolyzed and the liberated hydrocyanic acid steam distilled and titrated with silver nitrate in an ammoniacal medium in the presence of potassium iodide, the hydrocyanic acid forming the soluble complex $Ag(CN)_2$. The end point of the titration is characterized by the appearance of permanent turbidity due to precipitation of silver iodide.

Autolysis of bound glucosides will not take place in sago, since the enzyme linamarase associated with hydrolysis of the glucoside, linamarin, is completely lost during processing. Hence, extraneous addition of linamarase is needed to release free hydrocyanic acid (HCN) from any bound glucoside.

A-2 APPARATUS

A-2.1 Mechanical Grinding Mill

A-2.2 Sieve, with 1 mm aperture.

A-2.3 Weighing Balance

A-2.4 Volumetric Flask, 250 ml capacity.

A-2.5 Pipette, 100 ml capacity.

A-2.6 Steam Distillation Apparatus

A-3 REAGENTS

A-3.1 Sodium Hydroxide Solution, 2.5 percent.

A-3.2 Ammonia Solution, Approximately 6 M prepared by diluting concentrated ammonia solution (0.9 g/ml) with an equal volume of water.

A-3.3 Potassium Iodide Solution, 5 percent.

A-3.4 Silver Nitrate Standard Solution, 0.02 M.

A-3.5 Linamarase solution:

A-3.5.1 *Isolation of Linamarase from Cassava Leaf/Rind*

Cut cassava leaf/rind into small pieces and homogenize with chilled acetone using a homogenizer. Filter the slurry through Whatman No. 1 filter paper using a Buchner funnel and wash the residue with acetone till colorless. Air dry the acetone powder collected on the filter paper and store at –20°C. Stir acetone powder (10 gm) obtained from lead/rind with phosphate buffer (0.1 M, *p*H 6.0) for 30 min. Centrifuge the solution at 10 000 g and collect the clear supernatant. Add 3 volumes of chilled acetone and keep the solution at 4°C overnight. Collect

the protein precipitate by centrifugation at 10 000 g for 15 min. Dissolve the precipitate in 10 ml phosphate buffer (0.1 M, *p*H 6.0), dialyze against tenfold diluted phosphate buffer (0.01 M) and use for hydrolysis.

A-3.5.2 *Isolation of Linamarase from Cassava Latex*

Latex is collected from the cut ends of cassava petioles. 2 g latex is stirred with 50 ml phosphate buffer for 30 min and the solution centrifuged at 10 000 g for 30 min. Further process is similar as given in **A-2.5.1**.

A-4 PROCEDURE

Grind adequate quantity of the sample to pass through 1 mm sieve. Weigh 20 g of ground sample, transfer to 1 l distillation flask or 800 ml Kjeldahl flask, add 200 ml water and 1.0 ml linamarase to the system. Immediately connect the flask to the distillation apparatus. Let the system stand for 2 h for autolysis. Autolysis should be conducted with the apparatus completely connected for distillation including the receiving conical flask containing 20 ml NaOH solution (**A-2.1**). Steam distill and collect 150-160 ml distillate in the receiving flask. Cool and transfer the contents to a 250 ml volumetric flask quantitatively by rinsing the receiving flask a few times and make up the volume with water. Pipette 100 ml of this solution into a 250 ml conical flask, add 8 ml of 6 M NH_4OH and 2 ml of potassium iodide solution and titrate with 0.02 M $AgNO_3$ until permanent turbidity appears. For easy recognition of the end point of titration, it is recommended that a black background be used.

A-5 CALCULATION

1 ml 0.02 M silver nitrate = 1.08 mg of HCN.

ANNEX B

(*Foreword*)

COMMITTEE COMPOSITION

Foodgrains, Allied Products and Other Agricultural Produce Sectional Committee, FAD 16

Organization	*Representative(s)*
Directorate of Marketing and Inspection, Ministry of Agriculture, New Delhi	Dr Vijayalakshmi Nadendla (***Chairman***)
All India Food Processors' Association, New Delhi	Shri Krishna Kumar Joshi Shrimati Kamia Juneja (*Alternate*)
Central Food Technological Research Institute (CFTRI), Mysore	Dr M. S. Meera Dr V. B. Sashikala (*Alternate*)
Central Warehousing Corporation, New Delhi	Shri A. K. Malhotra Shri Sidharth Rath (*Alternate*)
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Consumer Guidance Society of India, Mumbai	Dr Sitaram Dixit Dr M. S. Kamath (*Alternate*)
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Directorate of Plant Protection Quarantine & Storage, Faridabad	Plant Protection Adviser Shri R. V. Singh (*Alternate*)
Food Corporation of India (FCI), New Delhi	Shri A. Rajagopal Shri Sachin (*Alternate*)
Food Safety and Standards Authority of India (FSSAI), New Delhi	Miss Aprajita Verma
G B Pant University, Food Science Division, Pant Nagar	Dr Satish K. Sharma Dr Sweta Rai (*Alternate*)
ICAR-National Rice Research Institute, Cuttack	Dr Awadhesh Kumar Dr (Shrimati) Padmini Swain (*Alternate*)

Organization	*Representative(s)*
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ICAR-Central Tuber Crop Research Institute (CTCRI), Thiruvananthapuram	Dr Krishnakumar T. Dr M. S. Sanjeev (*Alternate*)
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Indian Grain Storage Management and Research Institute, Hapur	Director
Indian Institute of Food Processing Technology (IIFPT), Thanjavur	Dr C. Anandharamakrishnan
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National Sugar Institute (NSI), Kanpur	Dr V. P. Srivastava
Protein Foods and Nutrition Development Association of India (PFNDAI), Mumbai	Dr Shatadru Sengupta Dr Jasvir Singh (*Alternate*)
Roller Flour Millers Federation of India (RFMFI), New Delhi	Shri D. V. Malhan
Vasantdada Sugar Institute (VSI), Pune	Dr Rajeev V. Dani Dr Sanjeev V. Patil (*Alternate*)
Warehousing Development and Regulatory Authority (WDRA), New Delhi	Dr Radhey Krishna Tripathi
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In Personal Capacity	Dr S. C. Khurana
BIS Directorate General	Shrimati Suneeti Toteja, Scientist 'E' and Head (FAD) [Representing Director General (*Ex-officio*)]

Member Secretary

Miss Lavika Singh
Scientist 'B' (FAD), BIS

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This Indian Standard has been developed from Doc No.: FAD 16 (12756).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Published by BIS, New Delhi